VII. Observations on some remarkable Strata of Flint in a Chalk-pit in the Isle of Wight, in a Letter from Sir Henry Charles Englesield, Bart. F.R.S. to John Latham, M.D. F.R.S. and L.S.

Read April 1, 1800.

DEAR SIR,

As you considered the specimens of flint which I showed you worthy of the notice of the Linnean Society, I transmit them to you, together with such an account of the situation in which I found them, as may perhaps lead to a guess of the causes of their present very extraordinary condition, and will at least serve as a guide to those who may wish at a future time to inspect the curious pit where I found them.

Before I enter on the particular description of that spot I cannot help saying a few words on the lithology of the island in general, which has not, that I know of, been described, as it highly deserves, by any naturalist. Had I been equal to such a task opportunities of observation were wanting, and the phænomenon which I am about to describe was discovered by me so short a time before I quitted the island that I had not time to inspect more than one pit besides that in which I sirst observed it.

The Isle of Wight, which is nearly of a rhomboidal form, lies with respect to its four angles, almost absolutely in the four points of the compass. It is divided into two very nearly equal parts by a range of chalk hills, whose general direction is due east and west. These hills do not, however, lie in a straight line, nor are they at all

6

of equal breadth or height throughout their extent. At Bembridge, where they form the eastern point of the island, they rife abruptly from the fea to a height of about 400 feet; and, bending a little to the northward, they continue of nearly the same elevation and a very narrow breadth, till they terminate at the valley through which the Medina runs. To the west of the Medina the range grows confiderably wider, and is fubdivided into feveral fubordinate This additional breadth gives the fouthern limit a great curvature to the fouth, while the northern line remains nearly straight. Their elevation increases much, and at Mottiston is 700 feet. The acute and perpendicular promontory in which they terminate to the west, well known by the name of the needles, is nearly as high as Mottiston. Besides the valley of the Medina this range is fingularly interrupted by two vallies exactly fimilar to each other at the two ends of the island. Brading Haven renders Yaverland at the east almost an isle, and the Yarmouth inlet cuts off the western end so nearly that at high tides it is sometimes quite infulated at Freshwater Gate.

To the north of this range of chalk hills the foil is chiefly clay, with a superstratum, in many parts, of gravel. The clay is interspersed with many beds of stone of different qualities, and which appear to lie in great confusion. Of these some are grit with a slight admixture of calcareous matter; others have nearly equal parts of sand and lime, and others are purely calcareous. In the first, which are of great hardness, very sew extraneous bodies appear. In the second are many sine impressions of shells, while the last are almost entirely composed of moulds of turbinated shells so as to appear quite honeycombed by them. This stone is, however, of great durability, for the walls of Cowes Castle, which was built by Henry VIII. and is exposed to the sea air from the west and north, are as perfect as on the day in which they were built. Below all these strata

strata of stone, at East Cowes, and just above a bed of black and folid clay, is a stratum of shells about two feet thick, of which a specimen accompanies this, and which is totally composed of these shells without any admixture or earth whatever. As the sea makes great inroads here, vast heaps of these shells lie on the beach, and seem just washed up by the waves, instead of being torn from their bed in the cliss. They appear nearly in the same state as those on the Hampshire coast, which have long been famous among naturalists. In the bed at East Cowes there appears however no variety; for I could see no species but what are here exhibited.

Whatever confusion in the strata appears to the north of the chalk range; or in that range itself, disappears to the south of it where the strata are nearly in a horizontal position, and fingularly regular and undiffurbed. The fea coast from Bembridge fouth to the Needles, except in the small extent of Sandown Marsh, is every where higher than the immediately contiguous land of the island, and to the south-east rises into a vast range of hills running from Dunnose west to St. Catherine's. The substratum of these hills feems every where to be clay lying in strata of different colour and purity. The lowest is black and very hard; approaching to shale. Above this some strata have a great mixture of fand, and take the appearance of a foft stone breaking into very regular cubical forms. These strata extend over the whole southern part of the island, and terminate against the chalk range very suddenly. Above the clay strata is a bed of stone in thin layers, and of very mingled materials, but in general very hard. Great quantities of chert or flint nodules appear in this stone. The general thickness of the stratum is from 150 to 200 feet. Above this the highest hills of the range have a stratum of chalk, not pure or white as that of the chalk range properly fo called, nor producing flint fo black.

VOL. VI.

The height of Dunnose is 800 feet above low water mark. St. Catherine's hill is at least 850. Of the former I had no opportunity of examining accurately the thickness of the strata; but at St. Catherine's the strata are as follow:

Chalk - 250 feet

Stone - 200 feet or perhaps not quite so much.

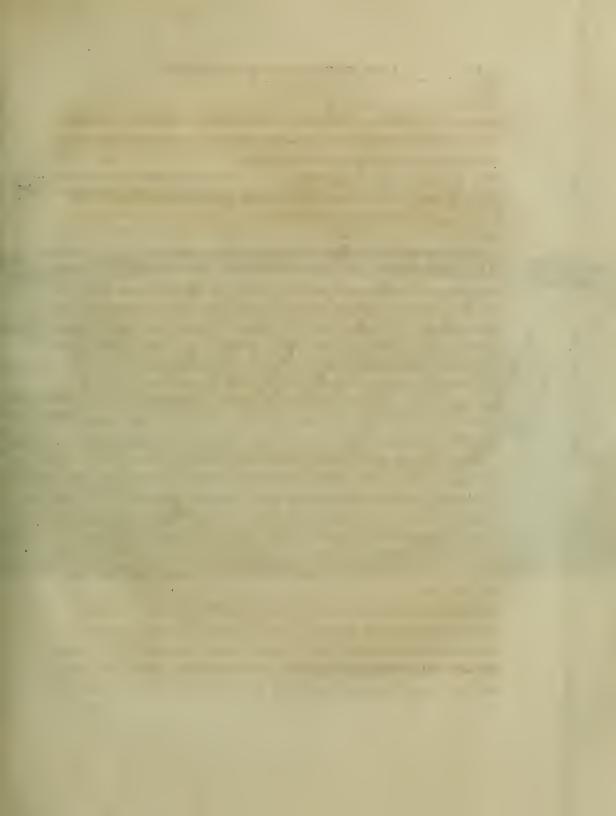
Clay and fand 400 feet

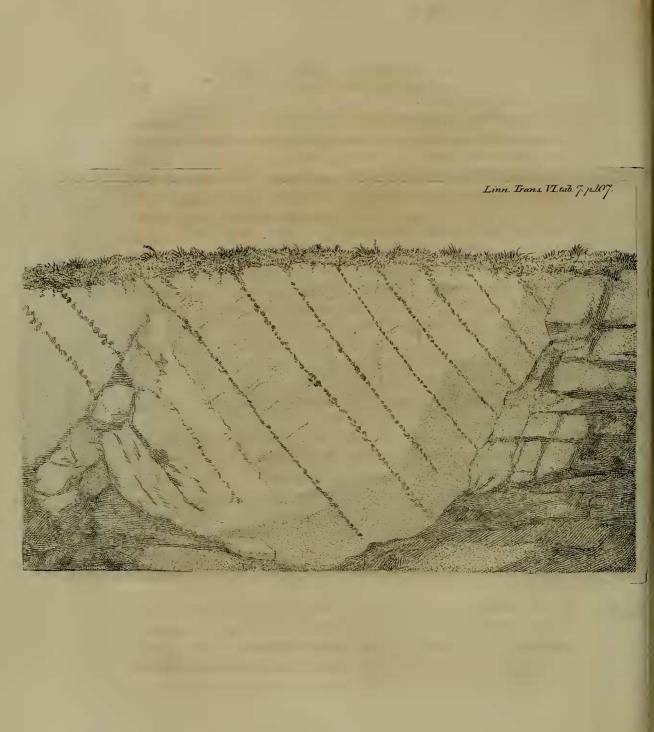
850

This arrangement accounts entirely for the formation of that fingular coast called the Undercliff, which extends from Dunnose to St. Catherine's, and is composed of the confused fragments of the upper stratum of rock which have given way and rolled down as the substratum of clay has been washed away by the sea. In most parts the process feems nearly at a stand; the coast being now protected by the sallen rocks; but at St. Catherine's great devastation is still taking place. The earth-sall mentioned last year was a very small operation of this kind when compared with the relicks of former convulsions.

From this short sketch of the general position of the strata in the island, I return to the particular subject of the present paper.

The chalk pit, which I am about to describe, is situated on the northern edge of the chalk range just out of the village of Carifbrook, and about an hundred yards beyond the division of the roads to Yarmouth and Shorwell. The pit is open to the east. The strata of chalk are very regular, from two to five feet in thickness, and divided by seams of slint from six inches to nine inches in depth. The slints are, as usual, in nodules of different sizes, from the size of the fist to twice the size of a man's head. The whole dip northward with an inclination of at least 67 degrees. Perpendicular sissues run through the whole from north to south, the sides of which





which are nearly as flat and fmooth as a wall. As these fiffures are followed with convenience in working the pit, an extensive face was laid open when I faw it, and the appearance was as in the annexed sketch. See TAB. VII. On examining the beds of flint nearly, I was aftonished to find that every flint, though lying in its place, and retaining perfectly its original shape, was more or less burst and shattered; some few were only split into large pieces, but the greater part were broken into small fragments, and some absolutely reduced to impalpable powder. From one which had fusfered the most the annexed specimen was taken. The powdet was fo very fine that I had conceived it must have been mixed with chalk; but, on washing it with diluted marine acid, I found that it was purely filiceous. Indeed the chalk which furrounds thefe flints is uncommonly folid, and does not exhibit cracks or marks of any violence except the great fissures beforementioned. fpecimen of the flint powder after washing in the acid is fent with the other.

I must observe that I had but imperfect opportunity of inspecting the slints which lay at a distance from the fissure; such however as I could see in the bed then working appeared to have been less shattered in proportion as they were more remote from the fissure; but all had suffered more or less.

About 200 yards below this pit, and nearer to Carifbrook village, the road is in part cut through the chalk, and the beds of flint exposed by that means exhibit the same appearances as those in the pit above.

The chalk pit above Shide Bridge, which is the only one I had an opportunity of examining after my discovery of the phænomenon above described, presents in some degree the same appearances, but does not afford so good an opportunity of viewing the strata as that at Carisbrook. The strata did not appear to me to lie so regularly